How To Guide: Maximize energy savings in school buildings

This activity focuses on implementing cost-effective energy saving measures in school buildings and emphasizes the key role of collaboration at the State and local level. It also provides an opportunity to educate students, teachers, and community members on the economic, environmental, and health benefits of energy efficiency and renewable energy technologies. This guide presents the steps involved in working with a local school district to carry out a program at the community level.

School energy costs are estimated at approximately $110 per student per year, depending on region and climate conditions. Total utility costs, including fuel, water, waste water, and trash, averages $140 per student. Energy efficiency and renewable energy solutions can yield savings of up to $50 per student per year. School districts can save 30% to 40% on annual energy costs in new schools and 20% to 30% in renovated schools by integrating energy efficiency and renewable energy measures. Energy savings can be redirected to fund other school programs, textbooks, computers, salaries, and maintenance and repair facility projects.

Desired Outcome:

Reduced energy consumption and costs in new and existing school buildings. Improved teaching environment, learning rates, test scores, and productivity.

Program Design

Steps

1. Understand your market: determine need for retrofits/new construction/new equipment or energy-efficient technology; characterize your building stock; identify school district and community priorities, etc.
2. Understand the decision-making process. Primary players are school board members, superintendents, and facilities managers (if the district has one). Also, State departments of education sometimes require plan reviews before districts can build new schools.
3. Gather baseline data on current energy use, energy costs and potential savings, student/teacher population, student absenteeism, and average test scores on standardized tests. Work closely with building engineers and custodians in your school district to determine energy usage.
4. Determine specific goals in terms of improved energy management and savings; daylighting and air quality.
5. Identify and access additional resources and partners, including utilities and local businesses, ESCOs, other State and federal agencies, and environmental groups.
6. Identify a “champion” who understands the school system to advance program.
7. Establish program design team to include students, teachers, principals, building engineers and custodians, school district representatives, and parents.
8. Identify funding mechanisms and leveraging opportunities. Sources of funding include: capital improvement programs, revolving loan funds, school district capital and operating budgets, school district bonding authorities, targeted loan funds, energy savings performance contracts and lease-purchase programs, and utilities (including opportunities through utility restructuring activities). ESCOs may provide financing and often include educational materials in their packages.
9. Partner with schools and other educational organizations to develop energy/environmental curriculum to help teachers and students understand benefits of energy-efficient and “green” design and construction practices.
10. Assign a full-time Resource Conservation Manager for the school district.
11. Hold workshops for designers/engineers/building custodians to educate on benefits of energy-efficient and renewable energy technologies and practices.
12. Provide training in energy-efficient operations and maintenance for maintenance staff and building operators.
13. Develop a plan to collect data and monitor changes relative to baseline.
14. Monitor program and make adjustments as necessary.
15. Document the results and market the program to other States and school districts.

Partners and Possible Incentives

- **Utility companies:** Load management; improved public relations. Utilities often provide excellent resources, including incentives for energy efficiency, low interest loan programs, and expert technical assistance.
- **Energy Service Companies (ESCOs):** Economic opportunity.
- **Teachers' Union, Principals, Superintendents, School Boards, Building Managers, Parent/Teacher Associations:** Healthier teaching environment and improved student performance; energy savings off-set scarce resources to fund computers, textbooks, salaries, and equipment; and reduce maintenance requirements with new, more efficient equipment.
- **Other national partners may include:** U.S. Department of Education, U.S. Environmental Protection Agency, Alliance to Save Energy, and American Institute of Architects.

Resources Needed

- Architectural and engineering expertise
- Financing expertise
- Staff time and training
- Support of local school board, superintendents, principals, parents, building engineers, and maintenance staff

Resources Available

School planning, design, and construction

- U.S. Department of Energy (DOE) EnergySmart Schools Program (www.eren.doe.gov/energysmartschools) Provides information on reducing energy costs through better school design and management practices.
- DOE's Rebuild America and the EREC/EREN Clearinghouse (www.eren.doe.gov/buildings/rebuild) and 1-800-DOE-EREC helps schools and other building owners create local partnership to plan and implement energy-efficient, cost-saving building renovations. Nearly 100 school districts nationwide are participating.
- DOE's Center of Excellence for Sustainable Development (www.sustainable.doe.gov) Excellent resource for sustainable development practices and success stories.
- DOE's Clean Cities Program (www.ccities.doe.gov) Program can connect to resources for school buses that run on alternative fuels, such as natural gas and electricity.
- U.S. Department of Education School Construction and Design (www.ed.gov/inits/construction/indes.html) Promotes Administration's proposal to modernize America's schools.
- U.S. EPA's Energy Star Buildings Partnership (www.epa.gov/buildings) or 1-888-STAR-YES (1-888-782-7937) Offers tools to help schools make buildings energy-efficient and reduce pollution.
- The National Clearinghouse for Educational Facilities (www.edfacilities.org) The most comprehensive listing of professional association and organizations, federal and State programs and resources, academic research centers, products and services, and publications devoted to the planning, design, construction, and maintenance of K-12 schools.
- Alliance to Save Energy's Green Schools Program (www.ase.org/greenschools/start.htm) Focuses on improving energy efficiency of K-12 school facilities.
- Sustainable Building Industries Council (www.sbicouncil.org) SBIC High Performance School Buildings provides information for decision makers about the value of high performance, sustainable schools.
- Whole Building Design Guide web site (www.wbdg.org) Provides building criteria, standards, sustainable design principles, and lessons learned.
- American Institute of Architects Committee on Architecture for Education (www.e-architect.com/pia/cae/welcom.asp) Issues related to pre-kindergarten through university level facilities. Architects who provide environmental or energy-efficient design can be found under the service type.
- K-12 Construction Facts (www.ed.gov/inits/construction/k12-facts.html)

Financing

- Qualified Zone Academy Bonds (QZABs) (www.ed.gov/inits/construction/generalqzab)
- Green Energy Finance (www.energyfinance.org) One-stop shop of energy efficiency financing resources for building managers, lending institutions, architects, and others.
- ESCOs (www.naesco.org) Listing of ESCOs around the country.

Improved Learning Environment

- Pacific Gas & Electric Study on Daylighting and Productivity (www.h-m-g.com)
- EPA's Indoor Air Quality in Schools (www.epa.gov/iaq/schools/) 1-800-438-4318. Provides information on improving air quality through better school design and management practices.

Benchmarking Performance

- LEED Green Building Rating System (www.usgbc.org/programs/leed.htm) The Green Building Council rating system that evaluates building performance relating to energy and sustainable design.
- Sustainable Building Technical Manual: Green Building Practices for Design, Construction, and Operations - A one stop shop for designers, builders, owners, and operators of public and private facilities to help implement energy and resource efficient/green design strategies. Copies can be obtained through the U.S. Green Building Council at (info@usgbc.org).
- DOE's Center of Excellence for Sustainable Development Toolkit (www.sustainable.doe.gov/toolkit/buildings.htm) Portfolio of programs and tools to measure energy use and potential savings.

Developing Energy Curriculum

- National Energy Education Development Project (NEED) (www.need.org) Promotes energy efficiency through the development of objective, multi-faceted energy education programs.

Key Conditions/ Factors

- Availability of energy use data at individual school or school district, and ability to characterize potential savings (knowledge of buildings, local energy costs, and conditions).

Special Opportunities for Success

- New school construction or planned retrofits of existing school buildings
- Budget surpluses at State level or within school capital and operating budgets
- New school board with priority on improving learning environment

Success Boosters

- Strong support of local champions
- Ability to market the program effectively to all decision-makers
- Clear examples of benefits and successful projects
- Ease of participation

Technology Transfer Plan

- Web site, conferences, and model schools
- EnergySmart Schools materials
- Local recognition awards for successful schools

Barriers and Potential Solutions

- **Difficulty obtaining funding within school district:** Use SEP funds as seed money; seek corporate partners; look for other State funding opportunities.
- **Lack of knowledge of available funding options to start program:** Seek peer advice from network.
- **Disinterest due to lack of knowledge of potential energy benefits:** Provide information to decision-makers on energy benefits and related environmental and economic benefits.
- **Lack of priority given to energy issues within school district and/or State:** Link energy efficiency benefits to other priorities. For example, demonstrate how the savings from a reduction in school energy consumption could fund another priority project.
- **Lack of in-house technical expertise:** Seek advice from peers, private sector volunteers, and through peer exchange with other States/programs.
- **Hidden agendas held by participants/clients:** Try to mesh benefits/outcomes to meet the needs of all participants.

Metrics

Primary:

- Square feet of building space retrofitted or built to energy efficiency specs
- Reduction in energy consumption, measured in Btus/square foot and monthly or annual cost savings

Additional Indicators:

- Decline in absenteeism
- Improved test scores on standardized tests
- Number of new partnerships between schools and State and federal agencies, environmental organizations, and local utilities and businesses

Case Studies/Examples

States reported that in 1998, they used $2 million in federal funds for energy efficiency schools programs, which leveraged $66.8 million in State funds, and $264.9 million in private-sector funds. (www.naseo.org)

DOE's EnergySmart Schools web site at (www.eren.doe.gov/energysmartschools) contains best practice examples for (1) improving existing buildings; (2) new construction; and (3) operations and maintenance procedures. The examples also include contact information.

South Dakota

South Dakota has implemented a comprehensive program aimed at saving energy in their schools and other institutional buildings, modeled after the former Institutional Conservation Program. Through this program, South Dakota provides grants for up to 50% of the cost of installing energy conservation measures in existing school buildings. To be eligible, projects must demonstrate a 15-year payback; projects with paybacks of 10 years or less are encouraged."

Texas

Texas developed a School Energy Management Program to provide a range of integrated services to school districts to improve energy efficiency. The State estimates that districts could reduce energy waste by $100 million annually. Workshops staffed by successful Texas school energy managers and energy professionals provide districts the tools to evaluate their energy needs and resources. The Energy Efficient School Partnership Service targets districts with fifteen or less campuses. It delivers personalized on-site assistance in calculating building energy cost and utilization indices, setting up energy-efficient operational procedures, and identifying appropriate financing sources for cost-effective capital energy projects.